

CESTODES FROM AUSTRALIAN BIRDS

I. PELICANS

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Fig. 1-17

Three new species of cestodes belonging to the genus *Hymenolepis* have been obtained from the only Australian species of pelican, *Pelecanus conspicillatus* Temm. Our present material was collected from eight birds, all from Taillem Bend, South Australia, Messrs. G. G., Fred., and Bryce Jaensch of that town, and Mr. L. Ellis, now of Murray Bridge, assisting us very generously. The material was obtained whilst we were engaged in other parasitological research work, carried out with the assistance of the Commonwealth Research Grant to the University of Adelaide. Types of the new species have been deposited in the South Australian Museum.

Hymenolepis murrayensis n. sp.

(Fig. 1-8)

This cestode was found in four of the eight birds examined. Egg-bearing worms were 90-185 mm. long by 0.75-0.83 mm. in maximum breadth. Segments are broader than long, but in those which are gravid, the relative difference in dimensions is less marked.

The small scolex is distinctly marked off from the neck and measures 0.17-0.25 mm. in diameter. The rostellar sac is 0.08 mm. wide and extends back as far as the posterior margin of the suckers. The rostellum has 20-22 hooks of two sizes and differing in shape (fig. 2, 3), the larger being 0.02 and the smaller 0.016 mm. in total length (*i.e.*, the distance between two parallel lines placed one at each end of the hook). The hemispherical or ellipsoid suckers measure 0.08-1 by 0.1-1.2 mm.

The unilateral genital pores lie in the middle of the edge of the segment. Elliptical calcareous corpuscles are scattered through the cortex. The ventral excretory canal of the poral side has a diameter about ten times that of the dorsal vessels. The ventral canal of the aporal side is very much narrower than its fellow. The excretory ducts pass below the genital ducts.

The testes develop before the ovary. Very early segments exhibit the outlines of the three testes and the cirrus sac, and those with mature testes show an immature ovary and yolk gland, while in later segments with a well-developed ovary the testes either are degenerating or have disappeared. One testis lies on the poral side of the segment, the other two on the aporal, one gland being more anterior and lateral than the other (fig. 4). In segments in which the ovary is just developing, the organs are about 0.11 mm. in diameter. The internal and external seminal vesicles can be seen most clearly in segments with a mature ovary and disintegrating testes. The external vesicula is retort-shaped and lies between the cirrus sac and the testes. Between the two vesicles is a coiled portion of the vas deferens. The internal vesicle occupies most of the length of the cirrus sac, and narrows gradually to the ejaculatory duct. The long narrow cirrus sac, which has a well-developed muscular wall, extends obliquely across three-fourths of the width of the segment and slightly under the overhanging part of the preceding segment. It measures 0.36-0.37 by 0.08-0.09 mm. in segments with

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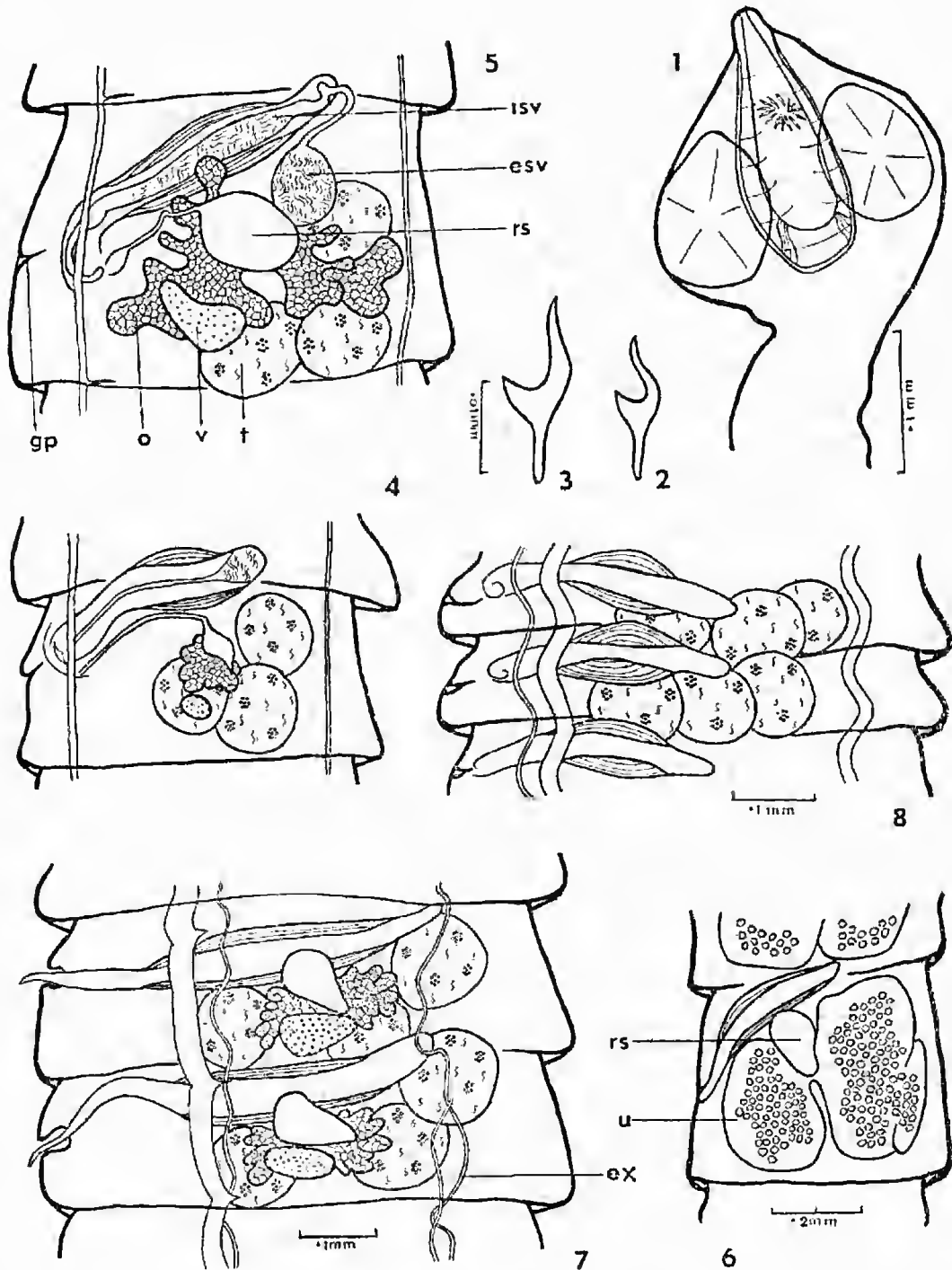


Fig. 1-8, *Hymenolepis murrayensis*: 1, scolex; 2, 3, rostellar hooks; 4, segment with mature testes; 5, segment with mature ovary; 6, gravid segment; 7, 8, segments from contracted strobilae. Fig. 2 and 3 to same scale; 4, 5, 8 to same scale. esv, external seminal vesicle; ex, excretory canal; gp, genital pore; isv, internal seminal vesicle; o, ovary; pr, prostate glands; rs, receptaculum seminis; t, testis; u, uterus; v, vitellarium.

mature testes, and 0.44-.52 by .075-.08 mm. in those with a mature ovary. There is a chitinized ring around the opening of the sac into the genital atrium.

The ovary arises between the three testes and reaches its maximum size (0.25-.3 mm. in diameter) when the testes are degenerating (fig. 5). It has 15-20 well-marked lobes. The yolk gland is compact. The large chitinized seminal receptacle, 0.154 by .113 mm., lies ventrally in front of the ovary, and, together with the cirrus sac, persists in gravid segments. The vagina travels behind the cirrus sac and parallel with it from the receptaculum to the genital atrium. The uterus arises as two lobes, one on either side of the ovary, but the organ later fills the segment and extends beyond the longitudinal excretory canals (fig. 6). Eggs measure about 0.04 by .03 mm., the oncospheres 0.02 by .014 mm., and the hooklets 8 μ long.

In this species the ratio of length to breadth of segments varies considerably according to the degree of contraction, and correlated with this the testicular arrangement shows variation. In strobilae with very short contracted segments the three testes lie almost in a straight line and the excretory canals are sinuous, but the number and sizes of the hooks agree with those of the more relaxed worms. Occasionally a strobila has some segments with a linear arrangement of the testes, whilst in others one aporal testes lies in front of the other. Some strobilae are more elongate, with segments squarish or even longer than broad.

The only other species of *Hymenolepis* with 20-22 hooks, described from Pelecaniform birds is *H. medici* Stossich, but the latter has hooks 0.03 mm. long, and its very large cirrus sac extends below the overlapping part of the preceding segment to its anterior aporal corner, and there is no aporal excretory canal (Fuhmann, 1906, 749). *H. fictitia* Meggitt (1927 a) has 24 hooks, 34-39 μ and 48-52 μ in length. *H. magniuncinata* Meggitt (1927 b) has more than ten hooks measuring 39 μ , and *H. parvicirrosa* Meggitt (1927 b) has more than 14, measuring 43-48 μ , these two species being thus differentiated from *H. murrayensis* by the sizes of their hooks. In *H. phalacrocorax* Woodland (1929) originally described as unarmed, the testes lie outside the longitudinal excretory canals. According to Hughes' key to species of the genus (1941), *H. murrayensis* would be placed near *H. fictitia*.

Hymenolepis jaenschi n. sp.

(Fig. 9-13)

This species was found in the eight pelicans examined. Egg-bearing worms, measure 40-85 mm. long and .62-.67 mm. in maximum breadth, with segments broader than long.

The scolex (fig. 9), 0.3-.39 mm. in diameter is sharply marked off from the neck. The rostellar sac, 0.07 mm. wide, and 0.16-.24 mm. long, extends back to the posterior margin of the suckers. The everted rostellum is 0.22 by .025 mm., and has 14 hooks in two alternating series, the larger hooks being 0.028 and the smaller 0.018 mm. long (fig. 10, 11). The suckers are about 0.2 mm. in diameter or 0.14 by .18 mm. if elongate. The unilateral genital pores are at, or slightly in front of, the middle of the segment margin. The poral ventral longitudinal excretory canal is about 0.022-.026 mm. in diameter, while the aporal and the two dorsal canals are very narrow. Calcareous corpuscles are abundant.

The testes and ovary appear at about the same time in young segments, but the former tend to persist in segments in which the developing uterus has displaced the ovary. One testis is aporal, two lie in the extreme posterior region of the segment, the other aporal testis lying in front of the ovary. They measure 0.064-.08 mm. in diameter. The external seminal vesicle is rounded or oval,

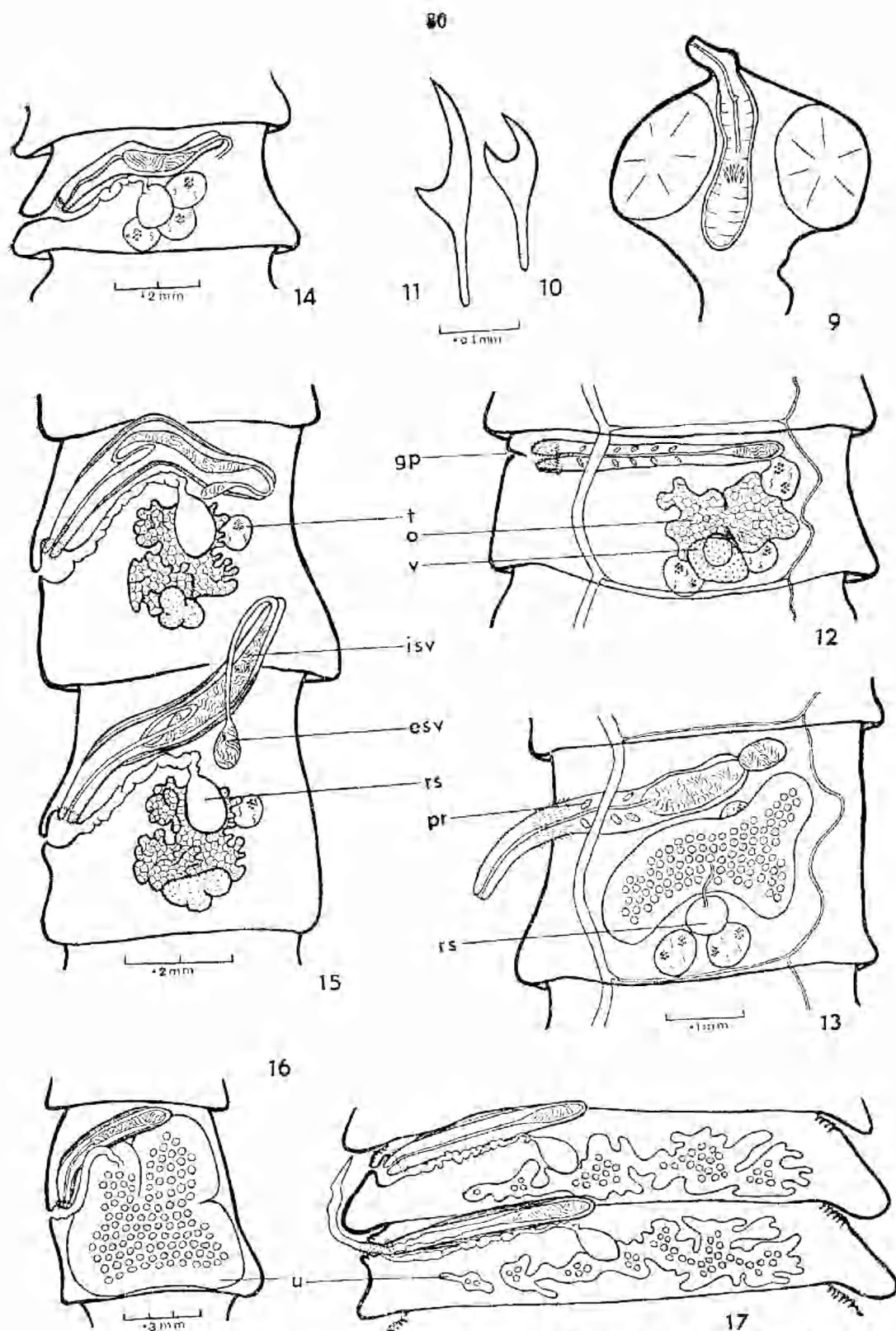


Fig. 9-13—*Hymenolepis jaenschi*: 9, scolex; 10, 11, rostellar hooks; 12, mature segment; 13, segment with developing uterus.

Fig. 14-17—*Hymenolepis ellisi*: 14, segment with mature testes; 15, segments with mature ovaries; 16, gravid segment; 17, segment from contracted strobila. Fig. 9, 12, 13 to same scale; fig. 10, 11; fig. 14 and 17.

0.058-0.078 by .05 mm.; the internal vesicle is elongate and may reach 0.05-0.116 mm. The thin-walled cirrus sac lies near the anterior margin of the segment and parallel with it; it measures 0.26-.29 by 0.05-.06 mm., and extends almost to the aporal excretory canal. There is a well-defined ring of small spines around the opening of the cirrus sac into the atrium, and the adjacent base of the cirrus is also provided with small spines for a distance of 0.05-.10 mm.

The ovary lies in the midregion of the segment between the testes and slightly toward the aporal side. Its two main lobes are subdivided into a total of about 8-10 lobules. It measures 0.052-.11. The large chitinated receptaculum lies behind the ovary, near the two posterior testes and dorsally to the yolk gland; it measures up to 0.073 by .053 mm. in segments containing testes and uterus. The vagina travels forwards from the receptaculum and then parallel with the cirrus sac to the atrium. In gravid segments, the bilobed sac-like uterus fills the medulla and extends beyond the excretory ducts. It is about 0.4 mm. long and 0.5 mm. broad. Eggs measure 0.04 by 0.3 mm., and the oncospheres 0.02 by 0.15 mm., with hooklets 8 μ long.

We do not know of any species of *Hymenolepis* with 14 hooks described from Pelecaniform birds. *H. magnuncinata* Meggitt (1927 b) and *H. parvicirrosa* Meggitt (1927 b) have already been mentioned above, but their hooks differ in number and size from those of *H. jaenschi*. If grouped according to Hughes' key (1941), *H. jaenschi* would approach *H. fictitia* Meggitt, a species with 24 hooks, 0.034-.039 and 0.04-.052 mm. long.

Hymenolepis ellisi n.sp.

(Fig. 14-17)

The material consists of three fragments without scolices, collected in August 1942. They include mature and gravid segments and measure 60, 70 and 100 mm. in length, with breadths of 0.72, 1.04 and .065 mm. respectively. Most segments are broader than long, but those which are gravid tend to be squarish or even longer than broad. The genital aperture is at about the middle of the margin.

The three round or elliptical testes (.065-.08 mm.) develop before the ovary. One is poral, the other two aporal, one of the latter being anterior to, and nearer the aporal edge of the segment than, the other. The external seminal vesicle lies aporally behind the end of the cirrus sac and measures 0.1-0.2 by .08-.09 mm., or exceptionally 0.2 by 0.12 mm. The vas then continues as a narrow tube into the cirrus sac where it widens into a long internal seminal vesicle, 0.03-.04 mm. wide and varying in length according to its contents. The long ejaculatory duct is coiled when the cirrus is retracted. The cirrus sac is large and thin-walled and may curve to form an arc with its concavity directed posteriorly, or it may appear to project into the preceding segment. The organ measures 0.42-.48 by .075-.085 in segments with mature testes, and may reach 0.5-.7 by .07-.11 mm. in gravid segments. Surrounding its opening into the large deep atrium is a ring of small spines, and the series is continued on the base of the cirrus. These spines become detached readily.

The greatly lobed ovary lies in the middle of the section. It arises between the three testes, but the latter disappear by the time the ovary reaches its maximum size (0.25 mm. in width). The slightly lobed yolk gland measures 0.1-.13 by .07-.09 mm. The thick-walled receptaculum lies between the ovary and cirrus sac, and measures 0.09-.11 by .145-.16 mm. The wide vagina (average breadth .035, maximum .044 mm.) lies behind and parallel with the cirrus sac, and becomes slightly coiled as it passes ventrally to enter the receptaculum. The

uterus arises as two lobes, one on either side of the ovary, but when fully developed it forms a sac filling the medulla and extending beyond the excretory canals. Eggs measure about 0.04 by 0.03 mm., the oncospheres 0.02 by 0.015 mm., and the hooklets 7 μ in length.

Gravid fragments collected on another occasion probably belong to this species because of the resemblance of the external seminal vesicle, receptaculum, wide vagina, deep atrium, spined cirrus, and ring of spines around the opening of the cirrus sac into the atrium. The maximum width of these segments was 0.09-1.3 mm., and the cirrus sac measured 0.6-0.75 by 0.8 mm.

This species differs from *H. murrayensis* in its spiny cirrus, thin-walled cirrus sac and the ring of spines around the outer aperture of the latter. It differs from *H. jaenschi* in its much larger cirrus sac, the position of the receptaculum, the disappearance of the testes before the ovary reaches its maximum size. The lack of a scolex prevents further comparison. The very large cirrus sac distinguishes it from all other *Hymenolepis* spp., from Pelecaniformes except *H. medici* Stossich. In his account of the latter, Fuhrmann (1906) did not give the measurement of the sac, but stated that it was very large, extending to the aporal anterior corner of the preceding segment or else bending into an arc in its own segment. The internal anatomy of the two species is rather similar. The finding of a scolex of *H. ellisi* should permit a decision as to the identity or otherwise of the two species.

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